

**XXVIII BRAZE/BRAZING PROCESS**

<b>I: REQUIREMENTS</b>			
1. Identify the standard the supplier uses for performing brazing.	<input type="checkbox"/> MIL- B-007883B <input type="checkbox"/> MIL- B-007883 Rev _____ <input type="checkbox"/> NAVSEA 0900-LP-001-7000	<b>OTHER</b> <input type="checkbox"/> (IF Other, Specify :)	
<b>II: ATTRIBUTES:</b>	<b><u>YES</u></b>	<b><u>NO</u></b>	<b><u>N/A</u></b>
2a. Does a written detailed procedure exists and is it utilized for the brazing process? Identify procedure number and revision.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2b. Does a written detailed procedure exist for assembly of components prior to brazing? Identify procedure number and revision.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Are procedures readily available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are inspection procedures utilized for brazing? Identify procedure number and revision;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are inspection and manufacturing personnel trained in use of procedures? Is this recorded and part of employee's file'?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Are brazing procedures written based on contract invoked requirements or generic and company based standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the procedure approved by the Customer? List Reference Approval Number, if applicable: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are procedures/work instructions adequate for control of:			
a. Proper Equipment, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Proper Materials, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. What types of tools are required in the use of the procedures? Specify sample of tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks:			

<b>SECTION I: REQUIREMENTS cont'd:</b>			
	<b><u>YES</u></b>	<b><u>NO</u></b>	<b><u>N/A</u></b>
10. Does procedure include system for identification of inspection status on parts and documentation? (e.g. inspection stamp)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SECTION II: Record Review:</b>	<b><u>YES</u></b>	<b><u>NO</u></b>	<b><u>N/A</u></b>
11. Identify inspection methods used to verify conformance with procedures and standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. a. What inspection documents exist and are they maintained to confirm inspection process was performed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Review and record number of samples:			
<b>ATTRIBUTES:</b>	<b><u>YES</u></b>	<b><u>NO</u></b>	<b><u>N/A</u></b>
13. Is trace ability maintained for material, which has been brazed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Are all tools, gages, meters, utilized for monitoring and/or Inspection a part of the manufacturer's calibration program?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Are certifications for raw materials used in brazing process reviewed for acceptance and maintained on file for review?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Adequate inspection work records are maintained.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. The shop traveler and work records can be traced to the inspection personnel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Verify that all completed records are properly reviewed, approved and maintained.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Verify Brazer Qualifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Verify Qualifications database is correct and up to date.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Follow up on any past audit findings and corrective actions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Review work packages, Drawings that identify brazing requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Randomly select Braze records that have been completed over a period of three (3) months (or longer if few joints were completed) and verify compliance to procedure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Select in-process Braze joint to audit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>SECTION III:</b> OBSERVATION OF BRAZING PROCESS		<u><b>SAT</b></u> <input type="checkbox"/>	<u><b>UNSAT</b></u> <input type="checkbox"/>	<u><b>N/A</b></u> <input type="checkbox"/>	
<b>ATTRIBUTES:</b>		<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>	
26. Detailed observation of brazer (complete one section for each brazer observed). NOTE: if determined to be N/A, provide an explanation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Additional Comments:					
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>					
27. Identify process observed. Specify class and type and/or grade.					
	<input type="checkbox"/>	TY-I	Torch		
	<input type="checkbox"/>	TY-II	Furnace Brazing		
	<input type="checkbox"/>	TY-III	Induction		
	<input type="checkbox"/>	TY-IV	Resistance		
	<input type="checkbox"/>	TY-V	Dip		
Brazer identification:					
NAME:		BADGE	CLOCK#	SHIFT	
Base material(s) being brazed.					
<b>STAINLESS</b>	<b>CARBON STEEL</b>	<b>COPPER</b>	<b>NICKEL</b>	<b>CU/NI</b>	<b>ALUM</b>
* If transition joint mark both materials			<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>
29. Check Brazing process		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
a. Procedure number:					
<hr/>					
b. Is the Brazer familiar with details of the procedure?		<u><b>SAT</b></u> <input type="checkbox"/>	<u><b>UNSAT</b></u> <input type="checkbox"/>	<u><b>N/A</b></u> <input type="checkbox"/>	
30) Verify procedure compliance for:					
a) Base material applicability		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Fitting/Joint dimensions are in accordance with Military specifications or an approved Drawing		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Braze alloy receipt inspection records are correct.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Braze alloy requirements are in compliance (specific combination allowed by procedure is allowed by specification).		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SECTION III:				
OBSERVATION OF BRAZING PROCESS cont'd:				
ATTRIBUTES:		<u>YES</u>	<u>NO</u>	<u>N/A</u>
1. Ensure Brazers qualifications are in accordance with procedure (training records, test, maintenance, re-qualification, eye exams, corrective lenses, proficiency records, etc.)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Verification joint preparation (Squared, De-Burred, any required scribe marks are applied and noted if any deviation is required)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Verification of the joint preparation and assembly is performed in accordance with approved procedures		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Markings Verification		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Identification markings on fitting for pipe or tube below .125" wall thickness is per procedure.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Pre-cleaning		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Fabrication process (proper brazing technique is being applied, proper size torch tip, joint bends are locked in place, proper face feeding, supplemental face feeding when required and Scribe Lines verified/documented). (When required preheat is verified by use of a surface contact pyrometer or other temp indicating device such as temp sticks, etc.)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Type of Filler metal		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Type of Flux and correct consistency		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Re-Fit due to time limits (Flux Dries)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Preheat		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Brazing Temperature		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Repair		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Face Feed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Post cleaning		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Cooling		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Flux Removal		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Heat Treat		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Passivation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks:				
_____				
_____				
_____				
SECTION IV: INSPECTION		<u>SAT</u> <input type="checkbox"/>	<u>UNSAT</u> <input type="checkbox"/>	<u>N/A</u> <input type="checkbox"/>
ATTRIBUTES:		<u>SAT</u>		<u>UNSAT</u>
10. Aided Visual Inspection (5X)		<input type="checkbox"/>		<input type="checkbox"/>
21. Ultrasonic Test (UT) satisfactory?		<input type="checkbox"/>		<input type="checkbox"/>
22. Contour of joint?		<input type="checkbox"/>		<input type="checkbox"/>
23. Dimensions? (Especially for evidence of any deviation from fit-up dimensions (e.g., "pull-out" and angular distortion "cocked", verification of material meets fit-up requirements by use of previously applied scribe line to ensure material fabrication is within limits )		<input type="checkbox"/>		<input type="checkbox"/>
24. Porosity limits?		<input type="checkbox"/>		<input type="checkbox"/>

NAV28

--	--	--

<b>Defects Present:</b>	<u><b>YES</b></u>	<u><b>NO</b></u>	<u><b>N/A</b></u>
Pinholes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concentrated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Linear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blisters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Residual Flux?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excess Braze Metal?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Un-melted Alloy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Undercutting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Penetration?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Defects (if applicable)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SECTION V: MATERIAL CONTROL PROCESS</b>	<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>
<b>ATTRIBUTES:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Sample material process per ANSI Z1.4, AQL 2.5 or Other approved procedure? Document which Procedure: _____		<input type="checkbox"/>	<input type="checkbox"/>
26. Are their adequate methods of segregating accepted and rejected materials in use?		<input type="checkbox"/>	<input type="checkbox"/>
27. Brazing wire, rings, flux, and raw materials have traceable markings on containers.		<input type="checkbox"/>	<input type="checkbox"/>
What types of brazing materials are used? (List)			
	1	2	3
<b>SECTION V:</b>	<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>
<b>CLEANLINESS/ENVIRONMENTAL CONTROLS:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>ATTRIBUTES:</b>	<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>
28. Work areas are clean from debris and separate from other areas for brazing operations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Exhaust equipment is utilized in brazing areas to provide fresh air for personnel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Controls exist for handling and disposing of brazing waste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SECTION VI: FURNACE CONTROLS</b>	<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>
<b>ATTRIBUTES:</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>ATTRIBUTES:</b>	<u><b>SAT</b></u>	<u><b>UNSAT</b></u>	<u><b>N/A</b></u>
31. Are automatic temperature controlling and recording devices (potentiometer, e.g.,) provided to controls furnace temperatures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Are de-carbonization tests run when carbon and low alloy steel items are furnace brazed? If so are the Decarburization limits allowed correct (e.g., .003")?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Are periodic surveys conducted? Is data available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Is calibration status noted on control/recording equipment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>ATTRIBUTES:</b>	<b><u>SAT</u></b>	<b><u>UNSAT</u></b>	<b><u>N/A</u></b>
35. Is the dew-point and composition of atmospheres controlled to prevent oxidation or carbonization of carbon, low alloy and stainless steels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. What furnace atmosphere is used? a. Argon b. Hydrogen c. Other?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Are joint clearances controlled:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Furnace Braze	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Other Methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Aluminum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SECTION VII: OTHER PROCESS CONTROLS</b>	<b><u>SAT</u></b> <input type="checkbox"/>	<b><u>UNSAT</u></b> <input type="checkbox"/>	<b><u>N/A</u></b> <input type="checkbox"/>
<b>ATTRIBUTES:</b>	<b><u>SAT</u></b>	<b><u>UNSAT</u></b>	<b><u>N/A</u></b>
39. Induction Brazing: Are induction coils designed to assure uniform heating?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Is Dip brazing bath controlled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Are written instructions provided for the removal of brazing salts and or fluxes? Verify if process is in control.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SECTION VIII: REWORK CONTROLS</b>	<b><u>SAT</u></b> <input type="checkbox"/>	<b><u>UNSAT</u></b> <input type="checkbox"/>	<b><u>N/A</u></b> <input type="checkbox"/>
<b>ATTRIBUTES:</b>	<b><u>SAT</u></b>	<b><u>UNSAT</u></b>	<b><u>N/A</u></b>
42. Are re-worked Braze joints controlled (documented and number of repair attempts prior to requirement for disassembly)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Verify instruction for use of brazing alloy for repair.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Ensure Braze joint is re-fluxed prior to repair attempt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Verify the same NDT is used for acceptance of repaired joints during initial fabrication.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Ensure proper instructions are prepared and followed for routine repairs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**ADDITIONAL COMMENTS:**


---



---



---



---



---



---

